

taken at intervals during the day. The small waves in the portion of the curve drawn to 10 times the scale are the result of friction in the meter, in consequence of which the governor was in constant motion.

I must express my indebtedness to Messrs. Griffin and Sons, of Sardinia Street, who made a trial instrument for me when I was away in South Africa, and therefore out of reach. They have carried out my instructions accurately, and to my entire satisfaction.

*On the Spectrum of the Spontaneous Luminous Radiation of
Radium.* Part IV.—*Extension of the Glow.*

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In our second paper* we suggest “whether the β -rays, which are analogous to the cathode corpuscles, may not be mainly operative in exciting the radium glow. On this surmise it would be reasonable to expect some little extension of the glow outside the limit of the solid radium itself. We are unable to detect any halo of luminosity outside the limit of the solid radium bromide; the glow appears to end with sudden abruptness at the boundary surface of the radium.” We omitted to state that this conclusion was arrived at by eye observations. The radium was observed in the dark with a lens, and with a low-power microscope.

The earlier photographs of the spectrum of the glow were taken, for the purpose of comparison spectra, with the height of the slit reduced by shutters so as to be within the width of the exposed radium bromide, and, therefore, these photographs would not show whether the bright bands of nitrogen extend into the air beyond the radium. Subsequently photographs were taken with the whole height of the slit, and on these we find that all the bands of nitrogen do extend to some little distance outside the radium salt. Our attention at the time being directed to other phenomena of the glow, we did not examine the photographs to see if the nitrogen bands extended beyond the radium.

In a paper, dated August 22, 1905, F. Himstedt and G. Meyer† state that

* ‘Roy. Soc. Proc.,’ vol. 72, p. 410 (1903).

† F. Himstedt and G. Meyer, ‘Ber. d. Nat. Gesells. Freiburg,’ vol. 16, pp. 13–17.

in their photographs of the spectrum of RaBr_2 , the four nitrogen bands, 3577, 3371, about 3300, and 3159, extend beyond the radium salt, while the other less refrangible bands are not traceable outside the radium. In our photographs all the nitrogen bands project beyond the radium salt; the relative distance to which the extension can be detected in the case of each band being, as might be expected, in proportion to the strength of the impression of that band upon the photographic plate.

B. Walter and R. Pohl, in a paper, dated September, 1905,* give an account of experiments made with the help of screens, which show that for a distance of up to about 2 cm., the air surrounding radium bromide has an action on a photographic plate.

On re-examining an early photograph, taken in 1903 for another purpose, which is described in our second paper,† in which the RaBr_2 was enclosed in a very narrow tube of thin glass, we find that the bands of nitrogen, which are strong within the tube, show no trace of extension on the plate beyond the tube. The exposure of this plate was seven days.

This experiment, which we have repeated recently with an exposure of 14 days, shows that the luminosity of nitrogen in the near neighbourhood of radium bromide is not due to the cathode-like β -radiation, for this passes freely through glass.

Two explanations may be suggested: first, that the active cause is the α -rays;‡ or secondly, that the nitrogen molecules which encounter those molecules of the radium which are undergoing active changes are broken up into ions, which are projected outwards, and give rise to the glow of luminous nitrogen.§

* B. Walter and R. Pohl, 'Ann. d. Phys.', vol. 18, p. 406.

† 'Roy. Soc. Proc.', vol. 72, p. 412.

‡ B. Walter, July, 1905, showed by means of absorption screens that the radiation from radio-tellurium can produce the ultra-violet light of nitrogen ('Ann. d. Phys.', vol. 17, p. 367).

§ The experiments described in our last paper showed that probably the β -rays are not the operative cause of the nitrogen glow ('Roy. Soc. Proc.', vol. 76, p. 488).